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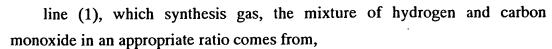
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- 1. A method for converting directly synthesis gas to hydrocarbons with high diesel distillates content through Fischer-Tropsch process, wherein:
 - (1) the synthetic fuels with diesel distillates as primary products are produced through one-step synthesis technique from synthesis gas;
 - (2) synthesis gas is composed of hydrogen and carbon monoxide with the mole ratio of hydrogen to carbon monoxide within the range of 1 to 4;
 - (3) activated carbon supported cobalt based catalysts were employed;
 - (4) synthesis conditions comprise reaction temperature within the range of 120 to 400°C, reaction pressure within the range of 0.5 to 10.0 MPa, volume hourly space velocity of mixture of hydrogen and carbon monoxide within the range of 100 to 5000.
- 2. A method of claim 1, wherein said Fischer-Tropsch process is a non-shifting Fischer-Tropsch process over an activated carbon supported cobalt based catalyst.
- 3. A method of claim 1, wherein the diesel distillates useful as a diesel fuel heavier than gasoline or as a blending component for a distillate fuel comprising: 180 to 380°C fraction directly synthesized from Fischer-Tropsch process and containing at least 95 wt % paraffins with an iso to normal ratio of about 0.03 to 0.3, <50 ppm (wt) of sulfur and nitrogen, less than about 2 wt % unsaturates, and about 0.001 to less than 0.3 wt % oxygen.
- 4. The method of claim 3, wherein the oxygen is present primarily as C_{12} the linear alcohols.
- 5. The method of claim 3, wherein the diesel fuels are characterized by a cetane number of at least 60 to 70.
 - 6. The method of claim 3, wherein the content of nitrogen and sulfur in fuels is less than or equal to 15 ppm (wt).
 - 7. The method of claim 6, wherein the content of nitrogen and sulfur is less than or equal to 10 ppm (wt).
 - 8. An equipment, useful in implementing the methods of claim 1 to 3, comprising:



purifier (2), where silica gel, 5Å molecular sieves and activated carbon are filled, and synthesis gas is first purified,

mass flow controller (3), controlling the velocity of stock feed, pre-heater (4), heating the stock feed,

Fischer-Tropsch reactor (5),

trap(6), where 180-245℃ fraction is recovered,

trap(7), where 80-180°C fraction is recovered,

trap(8), where 0-80°C fraction is recovered,

filter (9), through which the heavier(e.g., 245°C + fraction) still stays in the slurry tank and slurry liquid (paraffin liquid waxes) are withdrawn periodically.

- 9. An equipment of claim 8, wherein the Fischer-Tropsch reactor (5) used is a slurry reactor.
- 10. An equipment of claim 8, wherein the activated carbon supported cobalt based Fischer-Tropsch catalyst is placed in the slurry reactor (5).
- 11. An equipment of claim 10, wherein the Fischer-Tropsch catalyst placed in the slurry reactor (5) is first reduced in a flow of hydrogen or mixture of hydrogen and carbon monoxide under conditions of the reduction temperature within the range of 250 to 500°C, reduction pressure within the range of 0.3 to 1.5 MPa, hydrogen volume hourly space velocity within the range of 100 to 1000.
- 12. An equipment of claim 9, wherein the agitator in the slurry reactors is run with the rotate speed within the range of 400 to 1000 r/min.

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